

SOUTH FLORIDA

Environmental Report 2013

EXECUTIVE SUMMARY



MARCH 1, 2013



The State of Florida and the South Florida Water Management District continue to document progress in improving water quality, increasing water storage and reestablishing more historic water flows to benefit the South Florida ecosystem.

With a priority focus on Everglades water quality, the existing network of Stormwater Treatment Areas south of Lake Okeechobee treated more than 700,000 acre-feet of water and recorded their best performance to date, retaining approximately 81 metric tons of phosphorus, or 83 percent of the load received. Construction was also completed on 12,000 acres of additional treatment area – increasing the treatment capacity by 25 percent and bringing the total treatment area to 57,000 acres. This means greater volumes of water can be routed through the constructed wetlands in the coming years. Working in conjunction with the STAs, the Everglades Agricultural Area once again exceeded its 25 percent phosphorus-reduction requirement, delivering a 71 percent reduction this past year. A combination of source controls (improved farming practices) and treatment marshes have prevented approximately 4,100 metric tons of phosphorus from entering Everglades waters to-date.

Moving forward, the State and the U.S. Environmental Protection Agency reached a milestone agreement on further efforts to achieve state water quality standards for the Everglades. Under the expanded Restoration Strategies, the District will create more than 6,500 acres of new stormwater treatment area and 110,000 acre-feet of additional water storage through construction of upstream reservoirs. Supplementary source controls will also be implemented, and a science plan will focus research on further improving treatment area performance. Future issues of this report will include annual progress on implementation of the approved Restoration Strategies projects.

In other areas of the interconnected ecosystem, wading bird and waterfowl abundance numbers exceeded restoration targets in the physically restored portions of the Kissimmee River; phosphorus concentrations in Lake Okeechobee's water column continued to decline, recording the lowest average value since 1993; construction was completed on Phase 1 of the Lakeside Ranch Stormwater Treatment Area, a 2,000-acre wetland on the northeast side of Lake Okeechobee; dispersed water management on public and private lands helped increase water storage; and watershed protection plans were updated for both the St. Lucie and Caloosahatchee rivers and estuaries. Construction also continued on the Deering Flow-way component of the Biscayne Bay Coastal Wetlands Phase 1 project; the C-111 Spreader Canal Western Project (now completed) to benefit Everglades National Park and Florida Bay; and the expansion of a biological controls mass-rearing facility to grow, release, establish and monitor exotic plant-eating bugs to help combat the spread of invasive species.

With a steadfast focus on protecting the State's resources and carrying out our core mission responsibilities, we remain committed to implementing cost-effective, science-based solutions that sustain South Florida's environment, economy and quality of life.

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Florida Department of
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Foreword

The 2013 *South Florida Environmental Report* (SFER) marks the 15th year of consolidated reporting by the South Florida Water Management District and the Florida Department of Environmental Protection pursuant to Chapter 2005-36, Laws of Florida, and Subsection 373.036(7), Florida Statutes. This is the third year the SFER is a comprehensive three-volume publication. This Executive Summary focuses on major updates and accomplishments over the reporting year. The report distinctly serves the public and decision makers with thorough, up-to-date information on the many advances toward South Florida's environmental restoration and other key activities.

Volume I, The South Florida Environment, documents relevant scientific and engineering efforts throughout Florida, spanning diverse areas of the interconnected Northern and Southern Everglades systems. This volume satisfies the annual reporting mandates required by dozens of federal and state regulations and permits.

Volume II, District Annual Plans and Reports, comprises annual plans and reports required of all of Florida's water management districts. This volume captures the milestones in implementing the agency's strategic priorities and projects. Now in its ninth year, a web-accessible consolidated database is also included to efficiently provide additional project related information.

Volume III, Annual Permit Reports, expands on Volume I to further streamline unified reporting and comply with various permit-related reporting requirements. This volume supports the Comprehensive Everglades Restoration Plan Regulation Act, Everglades Forever Act, Northern Everglades and Estuaries Protection Program, Environmental Permitting projects, and Emergency Orders.

The entire 2013 report is available on the District's website www.sfwmd.gov/sfer. Overall, the far-reaching efforts featured in the SFER provide the scientific foundation of agency programs and projects that ultimately support prudent environmental decision making. With the ongoing support of stakeholders and the public, the 2013 SFER showcases sound management and progress toward restoration of the entire South Florida region.

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VOLUME I

Introduction to Volume I: The South Florida Environment

The 2013 South Florida Environmental Report (SFER) unifies dozens of agency reports into a single document consisting of a three-volume report with an Executive Summary. Prepared in cooperation with the Florida Department of Environmental Protection, this consolidated reporting supports the restoration, management, and protection activities associated with the Kissimmee Basin, Lake Okeechobee, the Everglades, and South Florida's coastal ecosystems. Complex regional issues of water quality, quantity, timing, and distribution are being addressed upstream to effectively improve the health of downstream systems. As such, the region is divided into the Northern and Southern Everglades based on delineated watershed boundaries. The Northern Everglades includes the Kissimmee area lakes and rivers, Lake Okeechobee, and the Caloosahatchee and St. Lucie rivers and estuaries. The Southern Everglades covers the Water Conservation Areas, Big Cypress National Preserve, Everglades National Park/ Florida Bay, and the coastal bays and estuaries south of Lake Okeechobee. This systemwide perspective helps integrate the agency's many regional programs and projects in achieving the restoration goals of the entire South Florida ecosystem.

Volume I, The South Florida Environment, provides status updates and data summaries for various monitoring and research projects associated with the South Florida ecosystem during Water Year 2012 (WY2012) (May 1, 2011–April 30, 2012). Following the Chapter 1 introduction, Chapter 2 presents detailed information on regional hydrology in support of subsequent chapters. Chapters 3 through 5 focus primarily on water quality information linked to Everglades restoration efforts, while Chapters 6 through 10 cover more diverse topics critical to the restoration and management of the South Florida ecosystem. Dozens of related appendices provide supporting data and more detailed analyses for the special-interest reader and to fulfill several permit requirements. Peer review of the draft Volume I report was conducted during fall 2012, and a summary of the review is appended to Chapter 1.

South Florida Hydrology and Water Management

The ecological and physical characteristics of South Florida have been shaped by years of hydrologic variation—ranging from extreme drought to flood, sometimes within a relatively short time period. South Florida hydrology is driven by rainfall, rainfall-generated runoff, groundwater recharge and discharge, and evapotranspiration. Region-wide water management is accomplished by more than 4,800 miles of canals and levees, roughly 1,300 water control structures, and 69 pump stations. Regional hydrology forms the foundation for restoration science and aids in interpreting results throughout this report. In fact, hydrological and water management information covered in this chapter is used as supporting data in most of the other Volume I chapters. WY2012 hydrology, including rainfall, water levels, inflows, and outflows for the regional water management system, is compared with the previous water year (WY2011) and historical conditions. The chapter also examines the hydrologic impact of the October 2011 high rainfall events.

Rainfall in Water Year 2012 Reflects a Drought Year

The 2011 La Niña continued into early 2012 and, as a result, the 2011–2012 dry season experienced drought conditions. The water year rainfall deficit was 3.65 inches. If not for three extreme rainfall events in October 2011, WY2012 would have been an extreme drought year. However, as a result of the wet October 2011, most of the District's 14 rainfall areas had above average wet season rainfall. On average, over eight months had below average rainfall, with August and October wet in all rainfall areas and April wet in nine rainfall areas. The driest rainfall area was Palm Beach (-9.78 inches), followed by Lake Okeechobee (-9.42 inches), East EAA (-8.24 inches), and West EAA (-7.84 inches). During WY2012, the southeastern and southern regions (Water Conservation Areas 1, 2, and

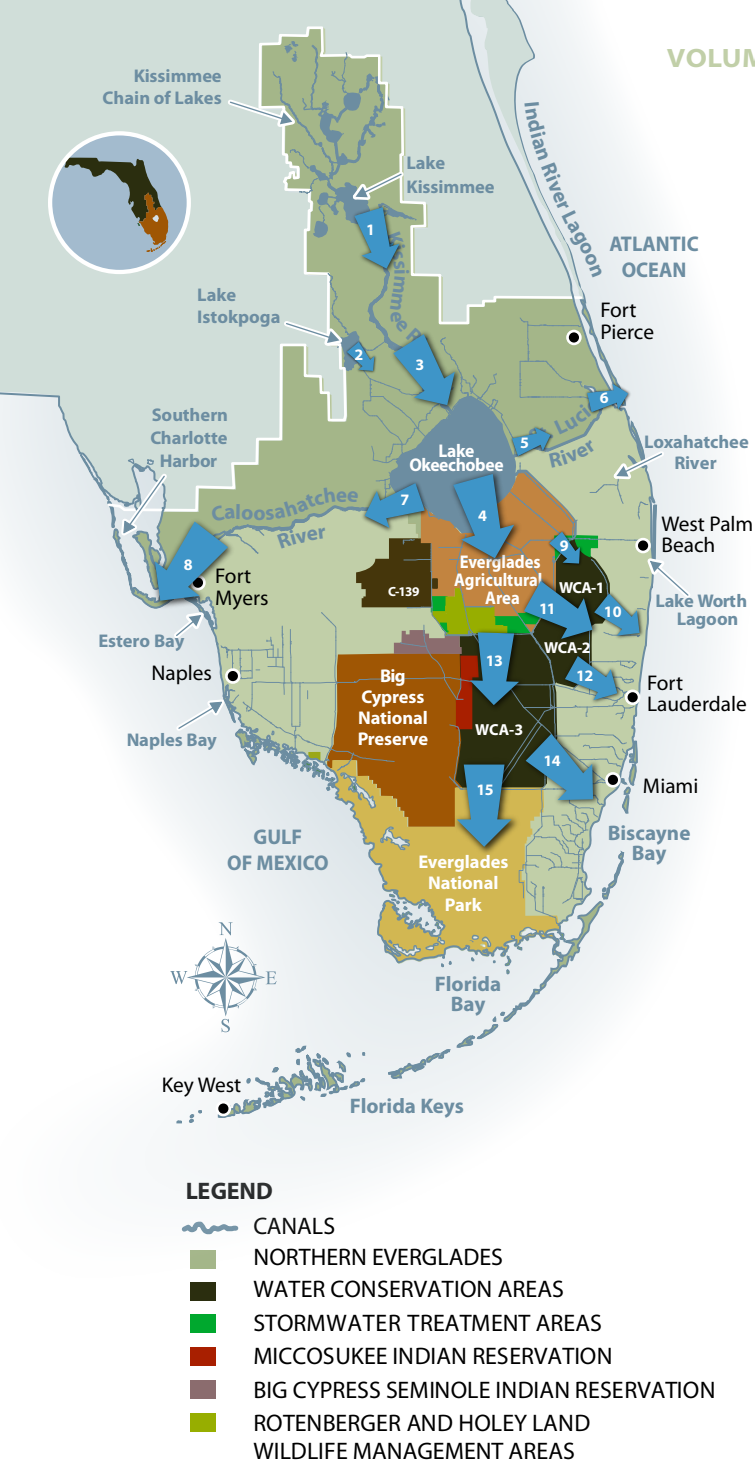
3; Broward; and Miami-Dade) had above average rainfall. Notably, five of the last six water years had rainfall deficits, continuing the trend of increased drought frequency over the past decade. South Florida's rainfall was also below average for WY2011, with a deficit of 12.35 inches.

Lake Okeechobee Water Levels Mirror Dry Conditions

Lake Okeechobee—the main storage of the regional water management system—was at a low stage of 10.92 feet National Geodetic Vertical Datum (ft NGVD) on May 1, 2011. However, the lake level further declined to 9.53 ft NGVD on June 23, 2011, due to drier-than-normal conditions in May 2011, seasonal increase in water demands, and high evaporation. Two consecutive La Niña drought years reduced runoff from the lake's watersheds. As surface and subsurface storages in these watersheds have to fill before adequate runoff is generated to increase lake storage significantly, reduced runoff resulted in both surface and subsurface storage depletion during the year. Overall, lake water levels remained relatively low through the summer until the three high rainfall events in October 2011 resulted in a marked rise in stage, with a maximum of 13.87 ft NGVD for the water year. Also during the year, the lake's storage reached critically low levels, hampering gravity flow and requiring the installation and operation of temporary pumps at the S-352 and S-351 spillways to withdraw water in May and June 2011.

As a result of the lingering drought, Phase I water restrictions continued with agricultural allocations reduced by 15 percent and urban lawn irrigation limited to two days a week. Also, in March 2011 the District's Governing Board imposed water supply restrictions to the east coast urban areas and permitted agricultural users in the Lake Okeechobee Service Area. A modified Phase III extreme water shortage restriction was authorized for the Lake Okeechobee Service Area.





Regional Inflows and Outflows

WATER FLOW (ACRE-FEET IN THOUSANDS)

Water Year
2012* 2011

1. Lake Kissimmee Outflows	814	464
2. Lake Istokpoga Outflows	228	122
3. Lake Okeechobee Inflows	1,821	848
4. Lake Okeechobee Outflows	746	1,564
5. St. Lucie Canal Inflows	47	285
6. St. Lucie Canal Outflows	0.119	269
7. Caloosahatchee Inflows	180	586
8. Caloosahatchee Outflows	599	1,141
9. Water Conservation Area 1 Inflows	170	153
10. Water Conservation Area 1 Outflows	15	217
11. Water Conservation Area 2 Inflows	386	467
12. Water Conservation Area 2 Outflows	378	420
13. Water Conservation Area 3 Inflows	900	722
14. Water Conservation Area 3 Outflows	571	826
15. Everglades National Park Inflows	744	935

* Water Year 2012 flows are reflected on map

Phase III urban lawn water use restrictions of one day a week for West Palm Beach, City of Palm Beach, and South Palm Beach were then approved in June 2011. Subsequently, the board rescinded all of South Florida's water restrictions in November 2011 following improvements in available storage with heavy October rains, but later issued a District-wide water shortage warning for the 2011–2012 dry season.

Regional Water Year 2012 Flows Declined Following Rainfall Deficits

Regional inflows and outflows for South Florida are shown in the map and table. The pervasive effect of consecutive

years of drought is clear when comparing historical average flows and those from WY2011 and WY2012. Lake Okeechobee inflows were 88 percent of the historical average, while outflows were 52 percent of the historical volume and about half of WY2011. Inflows to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Water Conservation Area 1) were severely restricted to about 36 percent of the historical average, while outflows reached a record low of 3 percent of the historical average. Overall, inflows to all the Water Conservation Areas were reduced and were generally lower than WY2011. Inflows to Everglades National Park for WY2012 were 744,176 acre-feet, 77 percent of the historical average.

Water Quality in the Everglades Protection Area

Volume I, Chapter 3A fulfills the reporting requirements of the Everglades Forever Act by providing an update on the status of water quality in the Everglades Protection Area (EPA). During WY2012, as in recent years, Everglades water quality generally met the state Class III water quality criteria specified in Chapter 62-302, Florida Administrative Code, with a few excursions being limited to specific areas within the EPA, as discussed below. This chapter also presents an update on nutrients in surface waters in the EPA, including a comparison of total phosphorus (TP) levels to the phosphorus criterion, and evaluates potential factors affecting water quality in this region.

Water Quality Monitoring Results

With more than 1,400 samples collected across 158 stations for 11 parameters, the majority of monitoring results are in compliance with state water quality standards. Similar to WY2011 monitoring results, water quality excursions were identified in WY2012 for dissolved oxygen (DO), alkalinity, pH, and specific conductance; however, these excursions were limited to specific areas of the EPA. With some excursions below the site-specific alternative criterion, DO is classified as a concern for several areas within the EPA. These excursions are attributed to phosphorus concentrations within impacted areas. Excursions found for alkalinity and pH in the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) reflect a natural condition resulting from the dominance of soft water in the refuge and are not considered violations of state water quality standards. As reported in WY2011, specific conductance was categorized as a minimal concern for some areas of the EPA and was generally associated with intrusion of mineral-rich groundwater into the canals and marsh areas highly influenced by these canal inflows. No exceedances were found this year for un-ionized ammonia. Additionally, no pesticides or pesticide breakdown products exceeded the toxicity guideline concentrations and no parameters exceeded state water quality standards. However, several pesticides or pesticide breakdown products were detected at levels above the method detection limit, including 2,4-D, ametryn, atrazine, atrazine desethyl, metolachlor, metribuzin, and norflurazon. All other parameters complied with their respective state water quality standards.

Surface Water Trends for Total Phosphorus

TP loads from surface sources to the EPA totaled approximately 36.7 metric tons (mt), with a flow-weighted mean concentration of 21 micrograms per liter ($\mu\text{g/L}$). Another 193 mt of TP are estimated to have entered the EPA through atmospheric deposition. The 36.7 mt TP load in the surface inflows to the EPA represent an increase of approximately 23 percent compared to the previous water year (29.9 mt in WY2011). Annual geometric mean inflow TP concentrations ranged from 40.3 $\mu\text{g/L}$ for the Refuge to 12.5 $\mu\text{g/L}$ for Everglades National Park (ENP). Annual geometric mean TP concentrations at interior sites ranged from 10.6 $\mu\text{g/L}$ in the Refuge to 4.3 $\mu\text{g/L}$ in ENP. Annual geometric mean TP concentrations for individual interior marsh monitoring stations ranged from less than 3.0 $\mu\text{g/L}$ in some unimpacted portions of the marsh to 60.9 $\mu\text{g/L}$ at a Refuge site that is highly influenced by canal inputs. Of the interior marsh sites, 72.1 percent exhibited annual geometric mean TP concentrations of 10.0 ppb or less, with 88.0 percent of the marsh sites having annual geometric mean TP concentrations of 15.0 ppb or less, which is the annual TP criterion for individual monitoring sites.

Five-Year TP Criterion Assessment in the Everglades Protection Area

The TP criterion rule specifies that each component of the four-part test be achieved for a water body to be considered in compliance with the criterion. The five-year (WY2008–WY2012) TP criterion assessment results indicate that unimpacted portions of each Water Conservation Area passed all four parts of the compliance test. In contrast, impacted portions of each water body failed one or more parts of the test. The impacted portions of the Water Conservation Areas consistently exceeded the annual and five-year network TP concentration limits of 11 $\mu\text{g/L}$ and 10 $\mu\text{g/L}$, respectively. In all cases, the annual network geometric mean TP concentrations for WY2012 in both the impacted and unimpacted areas were the lowest of the five-year assessment period.

Mercury and Sulfur Environmental Assessment for the Everglades

The Everglades has among the highest mercury levels in fish in Florida. This is due to South Florida's latitude, meteorology, and atmospheric chemistry, which cause high rates of inorganic mercury deposition from the atmosphere via rainfall and settling of particulates, as well as Everglades biogeochemistry, which further promotes conversion of inorganic mercury to methylmercury. This methylmercury biomagnifies to high levels through complex Everglades food webs, presenting risk to wildlife and humans consuming Everglades fish.

Volume I, Chapter 3B, together with Volume III, Appendices 3-1 and 3-2, fulfills the Everglades Forever Act requirement that the South Florida Water Management District and Florida Department of Environmental Protection annually issue a peer-reviewed report summarizing all data and findings of the State's mercury monitoring and research in South Florida. Key findings of Everglades mercury and sulfur monitoring and research as well as future needs are presented here.

- Over the past two decades, mercury concentrations in largemouth bass (*Micropterus salmoides*) in the Everglades Water Conservation Areas have declined by nearly 60 percent, which may be related to state regulations reducing emissions of mercury from waste incineration sources in South Florida in the early 1990s and decreased sulfate concentrations in some Everglades areas. However, since 2000, mercury concentrations have changed little. In contrast, fish mercury levels in the Shark River Slough region of Everglades National Park have remained high with no significant declines in the last 20 years.
- In 2011, median mercury concentrations in largemouth bass in the Everglades National Park (1.30 milligrams per kilogram, or mg/kg) were significantly higher than in the Water Conservation Areas (0.46 mg/kg). Both values exceed the wildlife protection criterion for trophic level 4 fish (0.346 mg/kg) and the human health criterion

for fish consumption (0.3 mg/kg) proposed by the U.S. Environmental Protection Agency (USEPA).

- Despite the decline in mercury in fish in the Water Conservation Areas, mercury levels in 75 percent of sunfish (*Lepomis* spp.; N=1,966) in the Everglades Protection Area (2000–2011) exceed the USEPA's proposed trophic level 3 methylmercury wildlife protection criterion of 0.077 mg/kg. These levels are a potential source of elevated mercury in higher trophic wildlife, including two federally listed endangered species [wood stork (*Mycteria americana*) in coastal Everglades National Park and Florida panther (*Puma concolor coryi*) in Big Cypress National Preserve].
- Mercury atmospheric wet deposition rates to the Everglades consistently rank among the highest in the U.S. Everglades mercury inputs are overwhelmingly from atmospheric deposition (95–98 percent) and originate predominantly from sources, mostly industrial, outside of the U.S. (over 95 percent). Accordingly, achievement of local reductions in atmospheric mercury deposition require international cooperation and will most likely be hampered by re-emissions of legacy mercury from past activities. Therefore, despite any potential international efforts, it may take decades to reduce methylmercury to acceptable levels in Everglades fish and wildlife through reductions in atmospheric inputs.
- Because sulfate is linked to methylmercury production, further study of sulfate inputs to the Everglades is needed. Evaluating the efficacy of potential sulfate reduction strategies requires quantifying the input and export of sulfur (i.e., developing a mass balance that accounts for sulfate from surface water inputs, sulfur application as an agricultural soil amendment, sulfate released from soil oxidation, inputs of connate seawater into canals, and sulfate from Lake Okeechobee).



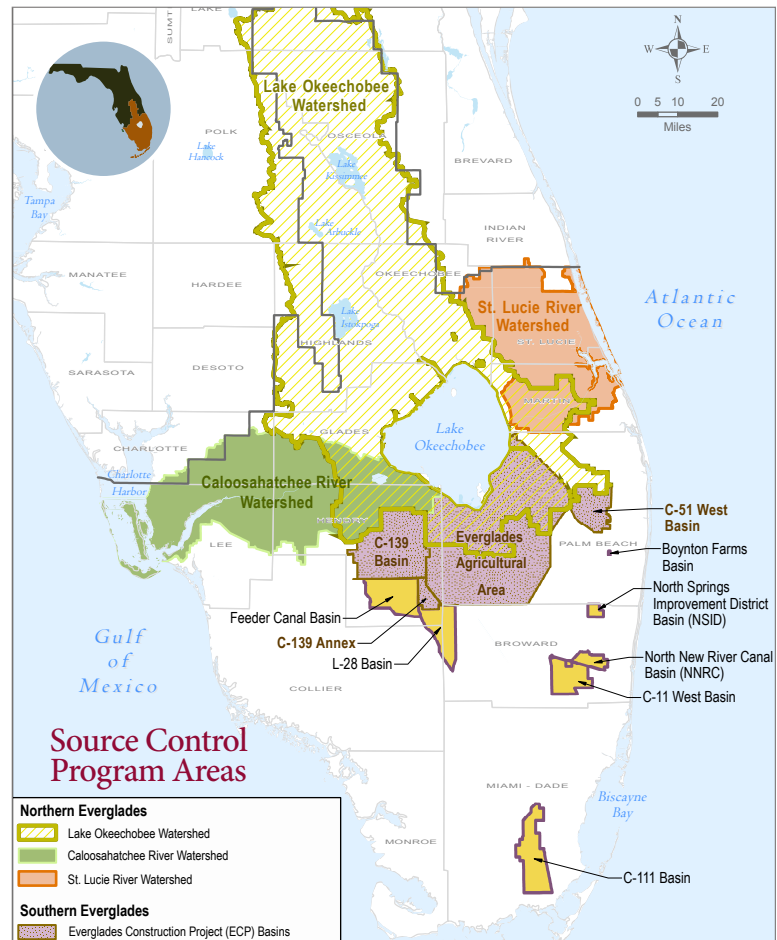
Nutrient Source Control Programs

Volume I, Chapter 4 provides an update for WY2012 on the phosphorus and nitrogen source control programs being implemented for the Northern and Southern Everglades by the South Florida Water Management District (see map). Nutrient source control programs are based on mandatory and incentive-driven Best Management Practices (BMPs). BMPs apply to agricultural and non-agricultural areas, and range from infrastructure improvements to optimized operations. By reducing nutrients in runoff, source controls aid in the restoration and protection of wetlands, rivers, lakes, and estuaries.

Program goals are assessed by water quality performance measures that gauge progress, made by implementing BMPs, toward achieving overall restoration objectives. Such measures have shown a long-standing record of success in the Everglades Agricultural Area (EAA) basin in the Southern Everglades. District source control programs continue to be developed for the Caloosahatchee and St. Lucie River watersheds and refined in the Lake Okeechobee watershed. The Northern Everglades efforts are coordinated with the Florida Department of Environmental Protection and Florida Department of Agriculture and Consumer Services. Highlights of the source control programs are presented below.

Northern Everglades: Lake Okeechobee and River Watersheds

- The Lake Okeechobee, St. Lucie River, and Caloosahatchee River watershed source control programs will include performance metrics that ensure consistent implementation of BMPs, measure actual reduction achieved, and have a mechanism for triggering improvements if water quality goals are not met.
- Preliminary performance measures for the Lake Okeechobee and St. Lucie River watersheds have been developed. Development of performance measures for the Caloosahatchee River watershed is under way.
- The Lake Okeechobee Watershed Assessment Monitoring Network was reviewed to reduce sampling visits during the dry season, and in-depth reviews of historical data were conducted in the St. Lucie and Caloosahatchee River watersheds to ensure data are adequate to support a regulatory program.



Southern Everglades

- The application of source control BMPs in the C-139 and EAA basins remains a successful approach to reducing total phosphorus (TP) inputs to the Everglades Protection Area (EPA). With WY2012 marking the 17th consecutive year of basin compliance and a long-term reduction of 55 percent relative to the baseline period, the EAA Basin achieved a 71 percent reduction in its TP load. WY2012 was the first year of full implementation of comprehensive BMP plans in the C-139 Basin. Discharges from the basin carried 15 metric tons (mt) of TP, which is below the predicted load from the pre-BMP baseline period. Research and demonstration projects to optimize BMPs are ongoing in both basins.
- The total TP load of 13 mt discharged to the EPA from the non-ECP basins during WY2012 represents continued decreased TP loads largely due to basin diversions and water quality improvement efforts. Demonstration and construction projects, as well as county cost-shared outreach and education, supported continued water quality improvements in discharges to the EPA.

Performance and Optimization of the Everglades Stormwater Treatment Areas

The Everglades Stormwater Treatment Areas (STAs)—STA-1 East, STA-1 West, STA-2, STA-3/4, STA-5/6—have been created in the Everglades Agricultural Area to reduce total phosphorus (TP) from runoff water before entering the Everglades Protection Area. Varying in size, configuration, environmental condition, and period of operation, the STAs are shallow, freshwater marshes currently providing approximately 57,000 acres of effective treatment area. Volume I, Chapter 5, presents information on the STA performance, operation, maintenance and enhancements, and related scientific studies undertaken during WY2012. The chapter fulfills various reporting mandates and addresses components identified in the Long-Term Plan for Achieving Water Quality Goals in the EPA.

Everglades STA Overview

- Since 1994, the STAs have treated more than 12.3 million acre-feet (ac-ft) of inflow and retained approximately 1,560 metric tons of TP that would have otherwise entered the EPA. In WY2012, the STAs treated more than 712,000 acre-feet of water, reducing TP loads by 83 percent and flow-weighted mean (FWM) TP concentration from 111 to 19 micrograms per liter ($\mu\text{g/L}$). Overall, the STAs retained about 81 metric tons of TP during WY2012.
- Through operational management and a series of enhancements, and despite the lingering impacts of the WY2011 drought, outflow TP concentrations remained very low for STA-1E, STA-1W, STA-2, and STA-3/4, with 21, 22, 12, and 19 $\mu\text{g/L}$ FWM TP concentrations, respectively. STA-5 performance continues to improve, with its lowest outflow FWM TP concentration of 32 $\mu\text{g/L}$ in WY2012. In contrast, STA-6, which is impacted by annual cycles of dryout and re-flooding, had its second highest level (75 $\mu\text{g/L}$) over its period of operation.
- Construction of pump stations in Compartments B and C was completed in September 2012. Vegetation grow-in continued through control of nuisance and undesirable woody species; monitoring efforts also continued to prepare for future flow-through operations.
- The STAs continued to recover from the WY2011 drought, particularly STA-3/4, which dried out in early WY2012. To allow for reestablishment of vegetation, approximately 55,000 ac-ft of water was diverted from STA-3/4 in July 2011. In the WY2012 dry season, roughly 34,000 ac-ft of supplemental water from Lake Okeechobee was delivered to the STAs (except for STA-6) to hydrate vegetation.
- In addition to routine vegetation management, additional bulrush (*Scirpus acutus*) was planted in deep areas and strategic locations to further protect submerged aquatic vegetation. STA-related research, including the STA-3/4 Periphyton-based Stormwater Treatment Area evaluation, continued this year.
- A total of 339 and 33 black-necked stilt nests were observed during April–July 2011 and April–June 2012 nesting periods, respectively. Operational adjustments were implemented as necessary to minimize impacts to nests during these periods.

Everglades Research and Evaluation

The South Florida Water Management District and collaborating agencies continue to sponsor research projects focusing on hydrology, wildlife ecology, plant ecology, ecosystem structure and function, and landscape science. Programs of study support short-term operational needs and long-term restoration goals, especially on regional hydrological information needs for decision making on Everglades projects. In Volume I, Chapter 6 highlights major research findings, including:

- Everglades ecology is influenced greatly by climate. In WY2012, a severe drought was averted because of heavy rainfall in October 2011. The general hydropattern was a significant delay in the start of the wet season, followed by a quick rise to an average water depth of about 2 feet, and then a recession rate very conducive for wading bird foraging. However, late dry season water depths did not reach optimal foraging depths for very long, influencing a rather unsuccessful nesting season.
- During the 2012 nesting season, approximately 26,395 wading bird nests were initiated. This estimate is comparable to those of 2011 (26,452) and 2010 (21,885) and is the third consecutive year of relatively poor nesting effort in the region.
- At the Loxahatchee Impoundment Landscape Assessment facility, a pilot study was initiated to assess fish movement across Everglades depth features and habitats under differing hydrologic conditions. Tree island monitoring also revealed that in the understory, species richness in 2010 was significantly lower than in 2009, indicative of succession to a healthy, closed canopy.
- Progress continued on the Active Marsh Improvement Project, in which methods to restore the ridge and open water slough structural patterning within nutrient-enriched cattail areas as well as appropriate herbicide treatment rates to remove cattails while minimizing damage to other plants are being studied. Immediately following a burn in January 2012, all study plots had extensive wading bird foraging activity, indicating that some of the ecological function had been restored.
- A study of tree island community structure indicated that vegetation composition is greatly linked to a fluctuating hydrology, suggesting that management thresholds for extreme events—either high or low water levels—will increase tree island resilience. Also, vegetation mapping in Shark River Slough from the 1950s to 2000s found a significant loss in the number and area of tree islands.
- During early WY2012, conditions in Florida Bay were characterized by high salinities and low water levels due to drought conditions at the end of WY2011. Heavy rains at the end of the wet season resulted in achieving targets outlined in the Minimum Flows and Levels rule.
- The DECOMP Physical Model is designed to examine the impacts of restoring flow between Water Conservation Areas 3A and 3B. In support of this model, pre-operation baseline, low-flow conditions variables, including flow velocity and direction, water chemistry, and sediment transport and accumulation rates, were collected this past year.



Status of Nonindigenous Species

With its mild climate, diverse environments and expanding urbanization, South Florida is particularly vulnerable to invasion by nonnative species. In Volume I, Chapter 7 reviews broad issues of established nonindigenous plants and animals in South Florida and their relationship to restoration, management, planning, organization, and funding. The chapter provides updates on priority species, highlights emerging threats to native plants and animals, and summarizes new research findings. It also discusses control or management activities for species capable of impacting District resources.

Nonindigenous Plants

- The District's aquatic plant management program is one of the largest in the nation, covering over 434,000 acres of District-managed waters. The agency's successful melaleuca (*Melaleuca quinquenervia*) management program is a national model for regional, interagency invasive plant control programs.
- Sixty-nine plant species are District priorities for control. While control programs for some aggressive plants, such as melaleuca, have been positive, challenges keep expanding as other harmful invasive plants are introduced. Further expansion of Old World climbing fern (*Lygodium microphyllum*) and Brazilian pepper (*Schinus terebinthifolius*) in parts of the Everglades is problematic. Recently established nonindigenous plant species with a high potential to become widespread invaders are the focus of interagency rapid response efforts aimed at containment and possible eradication.
- Biological control of several invasive plants continues to show promise, especially for melaleuca and Old World

climbing fern. More than 40,000 sterile Asian grass carp (*Ctenopharyngodon idella*) were released into 11 District canals for plant control in the water management system.

Nonindigenous Animals

- Nonindigenous animal species are numerous in South Florida, and prioritizing these species for control is challenging across regulatory agencies. This issue is complicated further by a deficiency of practical control measures.
 - The Florida Fish and Wildlife Conservation Commission is building its invasive animal management program and works closely with the District and other partners to manage nonnative animals in South Florida. During 2012, federal, state, and tribal partners continued rapid response efforts to control animal invaders such as the Nile monitor (*Varanus niloticus*) and Argentine black and white tegu (*Tupinambis merianae*) in the Greater Everglades region.
 - Burmese pythons (*Python molurus bivittatus*) continue to be removed in the Everglades and surrounding rural areas. The District remains actively involved in efforts to halt the spread of these snakes through search and removal and by supporting management-relevant research. The District and partnering agencies are implementing a region-wide python monitoring and removal program to better understand the distribution and abundance of pythons in the ecosystem.
- Looking ahead, nonnative invasions will remain to exert pressure on native species and ecosystem functions and require long-term, multiagency management. To address the persistent influx of new invasions, collaborating agencies are providing information to policy makers for developing strategies and regulations toward prevention.



Lake Okeechobee Watershed Protection Program

To improve the ecological health of Lake Okeechobee, the largest lake in the southeastern United States, the South Florida Water Management District and coordinating agencies are working to reduce excessive total phosphorus (TP) loading, extreme variation in water levels, and rapid spread of nonindigenous plant species. Several components of the Comprehensive Everglades Restoration Plan and the Northern Everglades and Estuaries Protection Program (NEEPP) are focused on addressing elevated TP levels, improving water quality, and providing alternative water storage to improve the regulation of lake levels. Volume I, Chapter 8 presents the WY2012 status of Lake Okeechobee and its watershed for these coordinated efforts.

Environmental Conditions in Water Year 2012

- Water inflow to Lake Okeechobee for WY2012 was 1.944 million acre-feet, which is 80 percent of the average annual inflow for the baseline period (2001–2009). Lake Okeechobee began the water year at elevation 10.92 feet National Geodetic Vertical Datum of 1929 (ft NGVD). Because of low water levels and dry conditions dating to early 2011, the District implemented modified Phase I and II water restrictions in March 2011. Low lake levels continued until high rainfall events in October, and then water restrictions were lifted in November 2011, when the lake crossed into the base flow sub-band. The lake ended WY2012 at an elevation of 11.68 ft NGVD.
- TP load to Lake Okeechobee from all drainage basins and atmospheric deposition was 377 metric tons (mt) in WY2012. The current five-year average (WY2008–WY2012) TP load was 387 mt, which is about 2.8 times higher than the 140 mt/yr Total Maximum Daily Load. Total nitrogen load to the lake from all drainage basins and atmospheric deposition was 4,620 mt in WY2012.
- Phosphorus concentrations in the water column have declined in recent years after reaching a maximum yearly average value of 233 ppb in 2005. In WY2012, the average value was 92 ppb, the lowest average concentration observed since 1993.

- Areal coverage of submerged aquatic vegetation in Lake Okeechobee increased to 36,325 acres from the previous year's total of 27,388 acres, resulting mostly from expansion of the macroalga *Chara* spp. These changes appear to be a continuing trend related to generally lower lake stages as a result of the implementation of the interim 2008 Lake Okeechobee Regulation Operating Schedule (2008 LORS) as well as recent dry conditions.

- Over the past year, algal bloom activity across the lake was quite low. There were no cyanobacterial toxin concentrations above the detectable limit.

- Wading bird nesting and foraging, a key metric for evaluating the lake's health, was poor relative to past years. The Lake Okeechobee fishery remains healthy and within expected historical parameters, although there was some decline relative to the previous year.

Lake Okeechobee Watershed Protection Program

- Following completion of the 2011 Lake Okeechobee Watershed Protection Plan Update as part of the NEEPP, key activities have been identified to further reduce TP loads to the lake. Notably, in WY2012 six research and assessment projects were under way or completed to help address water quality and storage enhancements of the Lake Okeechobee watershed.
- Numerous efforts have been conducted under the Lake Okeechobee Watershed Construction Project, which include completing the Lakeside Ranch Stormwater Treatment Area Phase I construction; continuing the operation of six hybrid wetland treatment technology facilities that combine chemical and wetland treatment to remove TP at sub-basin and farm scales; and implementing ongoing dispersed water management projects, which include both public and private landowners participating in various efforts that spread excess water across the landscape and require minimal new construction to retain large, cumulative volumes of water.

Kissimmee River Restoration and Basin Initiatives

In Volume I, Chapter 9 highlights the major WY2012 activities associated with the Kissimmee Basin. The Kissimmee Basin forms the headwaters of the historic Kissimmee-Okeechobee-Everglades system and is characterized by diverse wetland, river, and lake ecosystems. The Upper Basin includes the Kissimmee Chain of Lakes, and the Lower Basin includes the Kissimmee River. Channelized for flood control in the 1960s by construction of canal C-38, the Kissimmee River and its floodplain experienced pervasive ecological changes because the canal prevented flow in the original river channel and seasonal inundation of the floodplain. These changes included drastic declines in wetlands, diminished fish and wildlife populations, and loss of ecosystem functions.

In partnership with the U.S. Army Corps of Engineers, construction for the Kissimmee River Restoration Project began in 1999. Three of four restoration phases have been completed to date, with the final phase now under way and expected to be done in 2014. Numerous ecological benefits of the project have been documented by the District's Kissimmee River Restoration Evaluation Program. In recent years, the District has worked to integrate the restoration project with various management strategies for the Kissimmee Basin and Northern Everglades region, including the Kissimmee Chain of Lakes and Kissimmee Upper Basin Monitoring and Assessment Project, the Kissimmee Basin Modeling and Operations Study, and the Lake Okeechobee Watershed Protection Program.

Kissimmee Basin Highlights

- The first three phases of the Kissimmee River Restoration Project have reestablished flow to 24 miles of river channel and allowed intermittent inundation of 7,710 acres of floodplain. Construction activities advanced in WY2012 in the headwaters and lower part of the river.
- Water management operations maintained continuous inflow to the Kissimmee River restoration area throughout WY2012 despite below-average rainfall in the Kissimmee Basin. This key restoration goal has been achieved in 8 of the last 11 years under the interim regulation schedule. High rainfall in October 2011 allowed lakes in the Upper Kissimmee Basin to refill, produced record-high discharge rates in the Kissimmee River, and inundated the entire floodplain. The



restoration area met its inundation target of at least 180 days at most monitoring sites. The target for stage fluctuation was also met, but stage recession events were not as slow and prolonged as desired.

- During the water year, dissolved oxygen concentrations in restored portions of the river channel remained higher than pre-restoration levels and met two of the four restoration targets.
- Kissimmee River total phosphorus (TP) loads have declined since WY2005 due to lower inflows and recovery from the impacts of the 2004 hurricanes that crossed the headwater lakes. In WY2012, a large amount of TP originated from the S-65A sub-basin due to the October rain. However, this TP dissipated as water flowed through the restoration area, suggesting that the restored floodplain can retain large amounts of nutrients during flood events. This finding is significant for Lake Okeechobee source control efforts and is being investigated further in a soil study due for release in WY2013.
- Relatively dry conditions in recent years have reduced the number of wading birds using the river, but wading bird abundance was higher in the 2011–2012 season, raising the three-year running average above the restoration target. Waterfowl abundance was also greater and continued to exceed its restoration expectation.

Coastal Priorities

The South Florida Water Management District and collaborating agencies are working to preserve and improve South Florida's coastal estuaries, which depend on fresh water for their health. In Volume I, Chapter 10 presents key information and environmental results for the coastal ecosystems where efforts are focused on supporting restoration projects and regulatory rules, such as Minimum Flows and Levels. The chapter also serves as the annual report for the Caloosahatchee River and St. Lucie River Watershed Protection Plans under the Northern Everglades and Estuaries Protection Program. WY2012 highlights of coastal ecosystem findings and protection plan implementation are presented below.

- Changes in aquatic resources in the Caloosahatchee River Estuary (CRE) and St. Lucie Estuary (SLE) were ultimately a response to reduced rainfall in WY2011 and early WY2012. The total amount of fresh water entering the two estuaries was less than the long-term average and particularly reduced in WY2012, when there were no discharges from Lake Okeechobee.
- In turn, reduced freshwater input drove salinity increases during the WY2011 dry season and the beginning of WY2012. In response to increased salinity, numbers of the Eastern oyster (*Crassostrea virginica*) increased in both estuaries as did salt-tolerant seagrasses such as shoal grass (*Halodule wrightii*) and manatee grass (*Syringodium filiforme*).
- TN and TP loadings to both the CRE and SLE were less than the long-term averages, respectively, thereby reflecting reduced basin runoff and inflows from Lake Okeechobee.
- A significant algal bloom occurred upstream of S-79 in the CRE in May–June 2011 (WY2012). This bloom was associated with a period of greatly reduced freshwater inflow and high seasonal temperatures.
- From January–April 2012, District staff used a flow-through system for rapid characterization of surface waters and a series of vertical profiling stations to detect changes in estuarine hydrography, water quality, and plankton attributes on seven, independent research trips to the CRE.
- A suite of watershed construction projects are being implemented to improve hydrology, water quality, and aquatic habitats in the Northern Everglades watersheds and estuaries. For the SLE, these include the Indian River Lagoon – South C-44 Reservoir and Stormwater Treatment Area, Old Palm City Phase 3 Stormwater Quality Improvement, Manatee Creek Basin Water Quality Retrofit, and Manatee Pocket Dredging projects. For the CRE, these include the Spanish Creek-Four Corners Initiative, C-43 Water Quality Treatment and Testing Facility Project, and Caloosahatchee Basin Storage/Treatment Initiative.



VOLUME II

District Annual Plans and Reports

Chapter 2005-36, Laws of Florida, and Subsection 373.036(7), Florida Statutes, directs each of the state's water management districts to consolidate its annual plans and reports that are submitted to Florida's governor and legislature. Since 2005, the South Florida Water Management District has fulfilled this mandate by presenting the applicable plans and reports in Volume II of the South Florida Environmental Report. Incorporation of these reports into a single document has improved reporting efficiency and quality while also making the information more accessible to policy makers, stakeholders, and the public.

The project-related information described in this volume parallels the District's Fiscal Year 2012 (October 1, 2011 through September 30, 2012). Strategic priorities and projects drive the annual budget, and performance metrics provide the framework for measuring and reporting agency progress. Consistent with chapter topics and content in corresponding reports of the other water management districts, Volume II chapters cover the following:

- Fiscal and Performance Accountability Report
- Priority Water Bodies List and Schedule
- Five-Year Capital Improvements Plan
- Five-Year Water Resource Development Work Program
- Alternative Water Supply Annual Report
- Florida Forever Work Plan, Annual Update
- Land Stewardship Annual Report
- Mitigation Donation Annual Report

Now in its ninth year, the SFER Consolidated Project Report Database provides a comprehensive update on many District projects (activities with start and end dates) and processes (ongoing activities) that are referenced in the *2013 South Florida Environmental Report* (available at www.sfwmd.gov/sfer). The database is designed to uniformly describe projects and processes linked to report-related planning efforts and provide these details in one accessible location rather than repeating them in several reports. It also enables rapid data sorting, searches, and retrieval for efficient information and project management.

Fiscal Year 2012 Fiscal and Performance Accountability Report

The South Florida Water Management District tracks and manages agency performance by linking long-term strategic priorities, annual budgets and performance metrics reporting. Fiscal and Performance Accountability Reports (also known as Annual Work Plan Reports) are prepared quarterly, and the fourth quarter report represents the status at the end of the fiscal year. In Volume II, Chapter 2 presents the year-end report of the FY2012 Performance Accountability Report, the final step of the annual reporting cycle. The chapter highlights the FY2012 status of key projects/processes, financial summaries, accomplishments, and performance metrics.

Fiscal and Performance Accountability Report Remains Strong

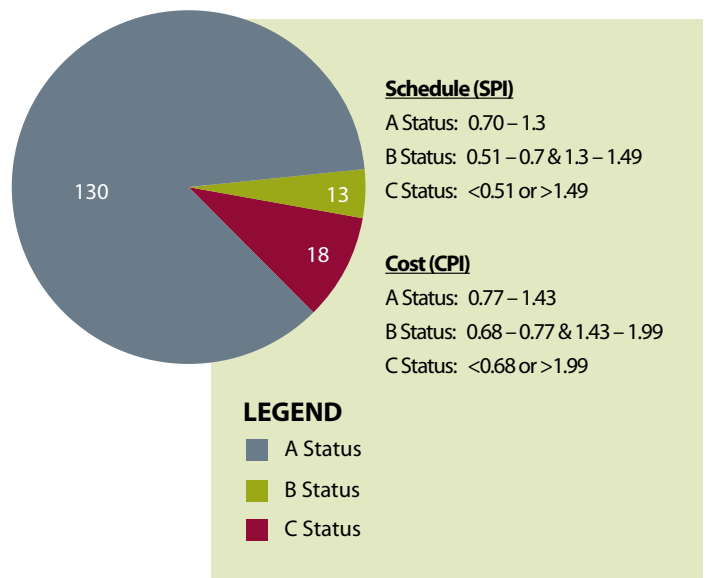
Earned Value is a key project management tool in which planned and actual completed work is compared to confirm if agency projects are on track. This report presents the FY2012 Annual Work Plan project milestone achievement based on Earned Value indices (schedule and cost) and performance level achieved: A (on plan), B, or C status. Performance indices were calculated for each project and measured against the defined ranges (see chart). A project with a Schedule Performance Index of 1.00 is exactly on schedule, and a project with a Cost Performance Index (CPI) of 1.00 is exactly on budget, which represents the ideal situation where project execution matches project planning. Overall in FY2012, 130 (81 percent) of the total (161) portfolio projects were categorized as A status, 18 (11 percent) in B status, and 13 (8 percent) in C status.

Established metrics quantitatively detail the performance of the SFWMD's processes and projects necessary to fulfill core missions at a minimal cost and time. They are the daily tools driven by data that help the agency better understand, manage, and improve overall performance. The metrics provide the information necessary to make effective and productive business decisions. Specifically, process performance measures indicate if the District is meeting its process goals, if the District's customers are satisfied, if the District's processes are in statistical control, and if and where operational improvements are necessary.

Fiscal Year 2012 Gross Revenues and Expenditures

The Annual Work Plan includes the status of revenue collection and expenditure rates. At year-end FY2012, the District collected 99 percent of its budgeted revenue.

Fiscal Year 2012 Status of Major District Projects and Processes (October 1, 2011 – September 30, 2012)



Collected taxes, which include both ad valorem property taxes and agricultural privilege taxes, were 100.8 percent of the agency's \$282 million budget. The largest portion of collections from property tax bills was in the first quarter—coinciding with the time that property owners receive the highest reduction (i.e., 4 percent discount for earlier payment in November, with discount decreases by 1 percent for each subsequent month through February)—and then collections slowed until the tax deed sales in June. The District's intergovernmental revenue collections by the end of the fiscal year were 66.8 percent (\$38.2 million) of the amount budgeted at the beginning of FY2012.

Expenditure rates are used as indicators of progress in program implementation. At the end of FY2012, the District expended 64 percent of its budget, a slight decrease from the 69.8 percent spent in FY2011.

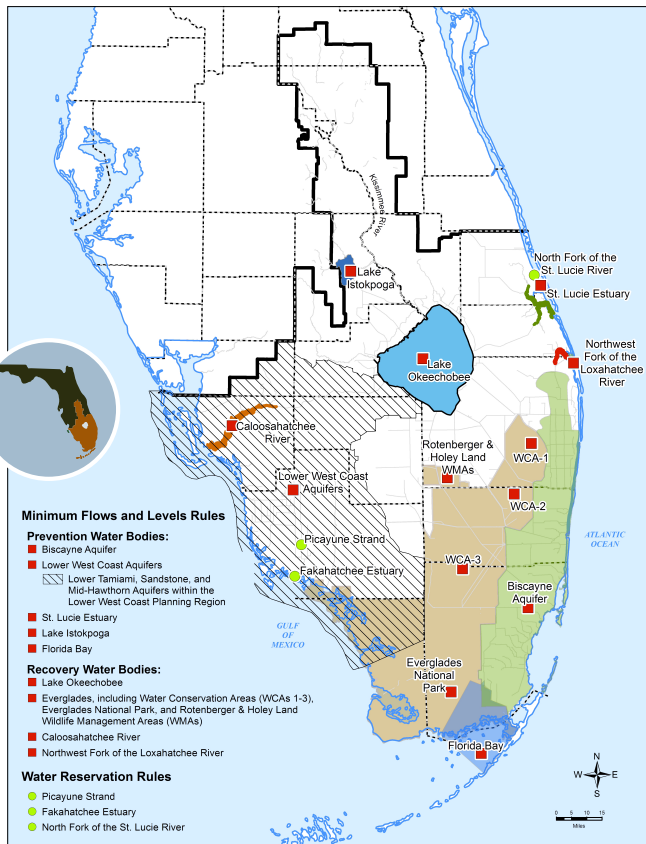
2013 Priority Water Bodies List and Schedule

To protect and conserve adequate water supplies for natural systems, the South Florida Water Management District applies region-wide water resource protection rules as well as Minimum Flows and Levels (MFLs), Water Reservations, and Restricted Allocation Area rules. In Volume II, Chapter 3 provides a summary of current rules in effect during 2012 and the priorities and schedule for developing new rules planned for 2013 through 2017.

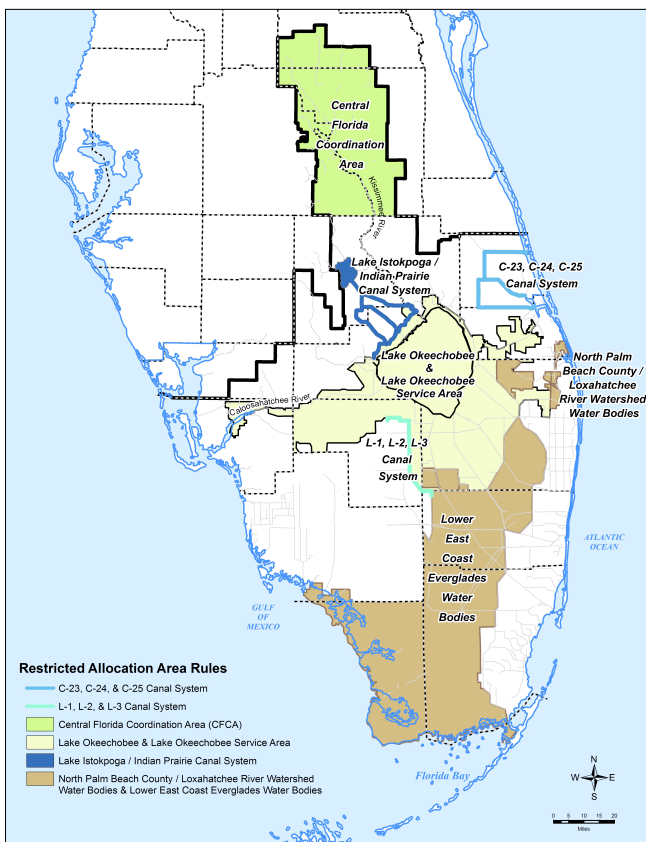
In accordance with state law, each year the District identifies specific water bodies for which MFL rules will be established. Another section specifies those water bodies for which Water Reservation or Restricted Allocation Area rules will be developed in order to protect natural systems from future consumptive use allocations. To date, the District has adopted rules for 13 MFL water bodies and 3 Water Reservation areas (top map) and implemented Restricted Allocation Area rules for several large areas (bottom map).

In 2012, the District continued collecting technical data and refining hydrodynamic and ecological models for the Caloosahatchee River and Estuary. Technical evaluation and documentation of current MFL criteria for Florida Bay also progressed this past year. This information will be used to help determine whether to update MFLs for these priority water bodies. In October 2012, the District's Governing Board adopted the 2013 MFL Priority Water Body List and Schedule, which was subsequently submitted to the Florida Department of Environmental Protection for review and approval. Planned activities in 2013 include continuing progress on the MFL evaluation for the Caloosahatchee River and Estuary and Florida Bay.

Additional planned rulemaking activities include continuing Water Reservation rule development associated with two Comprehensive Everglades Restoration Plan projects: the Caloosahatchee River (C-43) West Basin Storage Reservoir Project and Biscayne Bay Coastal Wetlands Project – Phase I. Water Reservation rule development efforts for the Kissimmee River, its floodplain, and the Chain of Lakes are expected to move forward in 2015 after completion of the Kissimmee Basin Modeling and Operation Study. Further details on these plans are available at www.sfwmd.gov/reservations.



Regional Priority Water Bodies



Five-Year Capital Improvements Plan

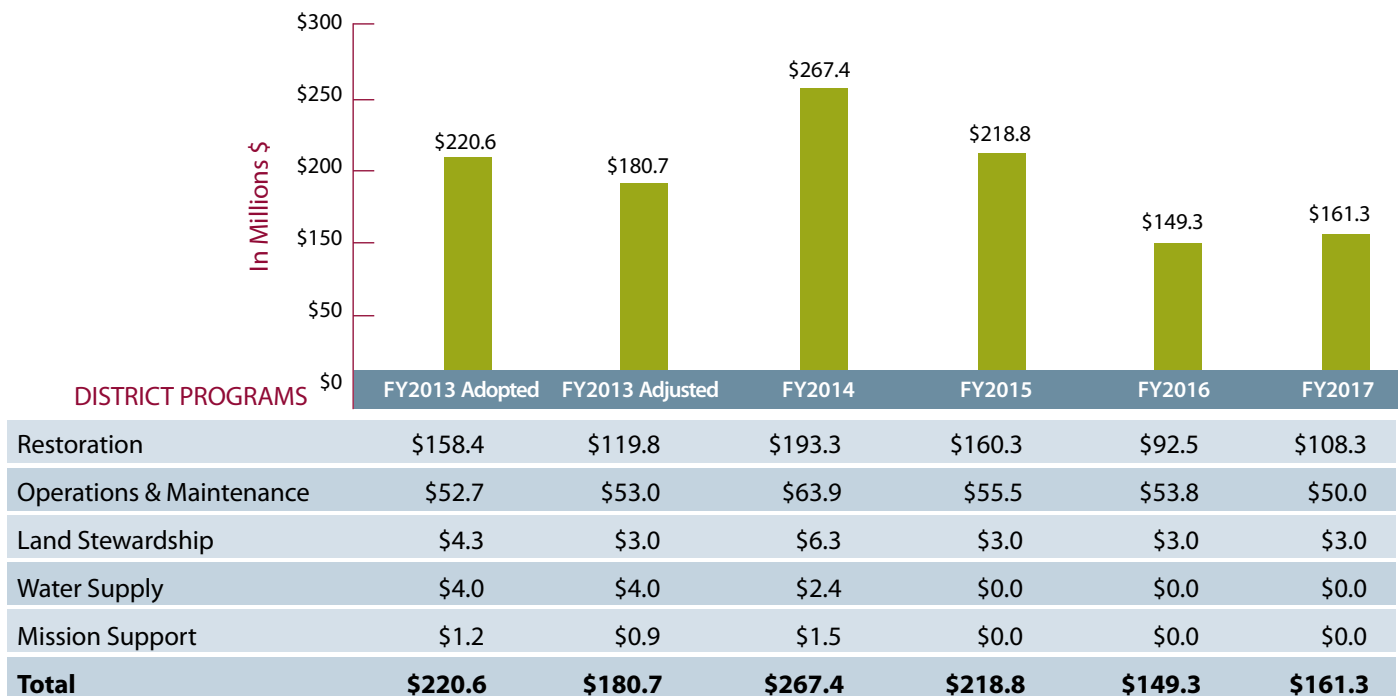
In accordance with Section 373.536, Florida Statutes, each year the South Florida Water Management District reports on the agency's Five-Year Capital Improvements Plan (CIP). The plan includes estimated capital project expenditures and anticipated revenues over a five-year period. Volume II, Chapter 4, includes projected revenues and expenditures for capital improvements for FY2013–FY2017.

The FY2013 adopted budget included a planned capital improvements project budget of \$220.6 million. Based on the revised estimated project schedules, the District's Five-Year CIP has been adjusted to a total of \$180.7 million for FY2013. The difference of \$39.9 million has been re-budgeted and included in the FY2014 amount in the plan, reflecting the preliminary budget submitted to the Florida Legislature on January 15. Over the next five years, FY2013 (adjusted) through FY2017, the District estimates spending \$977.5 million on projects contained in the Five-Year CIP. Currently,

the plan reflects ongoing commitments to District Governing Board priorities including \$399.6 million dedicated for Restoration Strategies projects; \$255.1 million in recurring ad valorem funds allocated for the refurbishment, replacement, and improvement of South Florida's flood control infrastructure; and other agency water supply and restoration priorities included in the Spend Down Plan.

A summary of the expenditures in the District's Five-Year CIP are shown in the figure below. These expenditures are for (1) basic construction costs including design, engineering, permits, inspections, and site development; and (2) other project costs including land acquisition and associated costs, surveys, and facility acquisition and improvements. More detailed descriptions of these capital projects are provided in the SFER Consolidated Project Report Database at www.sfwmd.gov/sfer.

Five-Year Annual Capital Budget Estimates
(Fiscal Years 2013–2017)



Five-Year Water Resource Development Work Plan

Updated Water Supply Plans in Progress

The purpose of water supply planning is to develop strategies to meet the existing and future water demands of urban and agricultural users while still meeting the needs of the environment. Regional water supply plans are updated every five years for each of the South Florida Water Management District's four planning regions and encompass a 20-year planning horizon. State law requires that all the water management districts prepare an annual Five-Year Water Resource Development Work Program to update the agency's implementation strategy for the water resource development component of each approved regional water supply plan. The Work Program is included in Volume II, Chapter 5A, to fulfill various reporting requirements on planning, projects, and funding related to water supply.

The most recent Upper East Coast Water Supply Plan and Lower West Coast Water Supply Plan updates were approved by the District's Governing Board in March 2011 and November 2012, respectively. It is anticipated that the next Kissimmee Basin and Lower East Coast Water Supply Plan updates will be approved in 2013. Plan updates identify

water resource development and water supply development projects expected to meet the needs of all reasonable-beneficial uses through 2030 during a 1-in-10-year drought event while sustaining water resources and related natural systems.

Allocations for Water Resource Development Projects

The District has allocated \$106 million in FY2013 for water resource development projects and anticipates spending \$515.3 million on these projects over the next five years (FY2013–FY2017). The FY2013 funding includes \$96 million for a portion of the Central and Southern Florida project system operation and maintenance budget that contributes to protecting and enhancing the region's water supply. Other projects include groundwater monitoring, resource assessments, conservation, and water resource protection activities. The allocations include \$903,000 in FY2013 and \$4.3 million from FY2013–FY2017 to implement the Comprehensive Water Conservation Program.

Alternative Water Supply Annual Report

Due to the limitations that exist on development of traditional freshwater sources, future regional water demands will be met primarily through developing Alternative Water Supply (AWS) sources. Alternatives include nontraditional water supplies such as brackish groundwater, surface water captured during wet weather, and reclaimed water. The South Florida Water Management District's program to support the development of AWS projects has been in place for more than a decade. This program, in cooperation with the state, has approved \$190.9 million since 1997 for the construction of 482 AWS projects. In Volume II, Chapter 5B provides an annual update on the agency's AWS funding efforts during FY2012.

In 2005, the Florida legislature created the Water Protection and Sustainability Program (WPSP), which established annually recurring state funding, when available, to the District for the construction of AWS projects. From FY2006 through FY2012, the District approved more than \$166 million in funding (including WPSP and carry forward amounts) for 292 projects that created over 430 million gallons per day of additional alternative water capacity.

AWS funds have been dedicated in FY2013 for eight regional projects, three of which are located within the Big Cypress Basin. Together, these eight projects will receive \$2.81 million and create 7.25 million gallons per day of AWS capacity.

Florida Forever Work Plan, 2013 Annual Update

In Volume II, Chapter 6A presents the 2013 annual update of the Florida Forever Work Plan. This chapter identifies projects eligible for funding under the Florida Forever Act (Section 259.105, Florida Statutes) as well as projects eligible for land acquisition funding from state-appropriated accounts or trust funds under Section 373.139(3)(c), Florida Statutes. Land acquisition activity during FY2012 is also provided in this chapter.

The 2013 Florida Forever Work Plan update identifies a total of 42 eligible projects under the Florida Forever Program, Northern Everglades and Estuaries Protection Program (NEEPP), Comprehensive Everglades Restoration Plan (CERP), and other water resource projects. The CERP Central Everglades Planning Project was added and 18 completed or inactive projects were removed from the list of eligible projects. Project modifications were made to the Biscayne Bay Coastal Wetlands, Broward County Water Preserve Areas, Everglades Agricultural Area Storage Reservoirs – Phases 1 and 2, and Loxahatchee River Watershed Restoration CERP projects to reflect revisions contemplated through the project planning and implementation process.

Progress under Florida Forever

In FY2012, the SFWMD obtained 1,134 acres of real estate interest, totaling of \$3.51 million; 140 acres were acquired in fee and 994 acres in easements. The acquisitions were funded by the District, leveraged with funds provided by the

state and local governments. No Florida Forever or Save Our Everglades Trust Fund monies were used to fund FY2012 land acquisitions.

As of September 30, 2012, a total of 243,147 acres of the estimated land needed to implement CERP have been acquired. CERP land acquisitions by the District in FY2012 totaled 186 acres at an investment of \$446,050. Miami-Dade County continues to secure land within District CERP projects, purchasing 158 acres for \$430,300 within the Biscayne Bay Coastal Wetlands Project. The District also purchased 7.5 acres for \$15,750 within the Picayune Strand Restoration, Fakahatchee Strand Project, and obtained 20 acres for the C-111 Spreader Canal Project through the mitigation program.

In FY2012, a total of 687 acres of Florida Forever project lands were acquired for the restoration, conservation, and preservation of natural areas, which include donated conservation easements covering 95 acres conveyed by Palm Beach County to the District within the Palm Beach County Natural Lands Project. The District invested \$1.25 million to acquire 56 acres within the Critical Corkscrew Regional Ecosystem Watershed Project. Additionally, 516 acres valued at \$1.17 million were obtained within the Kissimmee River Restoration through the surplus and exchange of District-owned land.



Land Stewardship Annual Report

Through land stewardship, the South Florida Water Management District is responsible for managing agency-owned lands, including Save Our Rivers and other natural conservation lands, as well as those areas being maintained for future water resource projects. The program also administers mitigation banks and regional off-site mitigation areas and oversees the development of recreational uses on these public lands. As of FY2012, program funds come primarily from ad valorem tax revenues, supplemented by other funding sources including off-site mitigation, mitigation revenue, lease revenue, and grants for wetland restoration and exotic control projects.

In Volume II, Chapter 6B highlights Save Our Rivers and Florida Forever natural lands projects for the District's five land management regions (Upper Lakes, Kissimmee/Okeechobee, East Coast, Everglades, and West Coast) and

FY2011–FY2012 land management activities and acquisition status for each region. The chapter also provides project descriptions for major program components: hydrologic and habitat restoration, vegetation management, invasive species control, prescribed burning, wildlife management, public use, water resource education, law enforcement, mitigation, infrastructure management, and management of project lands for future Comprehensive Everglades Restoration Plan and other water resource projects.

The District and its partners manage more than 1.42 million acres of public land while providing recreational opportunities to the public. In FY2012, the District invested \$7.8 million in land management, while \$4.1 million in revenue was generated from agricultural leases and mitigation banks. Land management costs in FY2013 are anticipated to be \$6.9 million.

VOLUME II • CHAPTER 7

Mitigation Donation Annual Report

Wetland Mitigation Funds Benefit Regional Restoration

Mitigation is the acquisition, creation, restoration, or enhancement of wetlands to compensate for permitted wetland impacts. Each year, Florida's water management districts report on the expenditure of funds received as mitigation for such impacts. Mitigation funding enables the South Florida Water Management District to direct funds toward priority restoration in a cost-effective manner that benefits the South Florida ecosystem.

In Volume II, Chapter 7 presents mitigation fund expenditures for FY2012 for the agency's two regional mitigation projects: Corkscrew Regional Ecosystem Watershed and Pennsuco Regional Mitigation Area. The chapter also describes restoration and management efforts for these projects. Spanning more than 60,000 acres in Lee

and Collier counties, the Corkscrew Regional Ecosystem Watershed contains some of the largest remaining pristine cypress wetlands in the United States, providing habitat to many protected species. Covering about 13,000 acres in Miami-Dade County, Pennsuco is an impaired wetland ecosystem that likely will continue to degrade and further impact adjacent natural areas unless invasive exotics are controlled. Importantly, continued enhancements to these vital wetlands offer regional ecological benefits and contribute to overall Everglades restoration goals.

Although neither project still accepts cash payments, existing dedicated funds are used for restoration and management. In FY2012, the District expended just over \$1 million on restoring 3,907 acres in the two areas. It is anticipated that FY2013 combined expenditures will be just over \$850,000.

The background of the page is a photograph of a sunset or sunrise over a field of tall, thin grasses. The sky is a warm, hazy orange and yellow, with the sun's glow creating a soft, diffused light. The grasses in the foreground are dark and silhouetted against the bright sky, with some small, delicate flowers visible on thin stems.

VOLUME III

Annual Permit Reports

Volume III efficiently builds on the South Florida Water Management District's consolidated reporting and simplifies the process for submitting annual permit reports and complying with specific reporting conditions required by permits issued by the Florida Department of Environmental Protection and the U.S. Army Corps of Engineers. This volume is also intended to assist in efforts to streamline the permit reporting process, so that meaningful comparisons of yearly progress can more easily be made and to assure the regulatory agencies that the District is documenting all permit-required information.

Specifically, Volume III summarizes the status of projects and environmental monitoring results collected during Water Year 2012 (WY2012) (May 1, 2011–April 30, 2012). The volume contains five chapters and 11 supporting appendices. These include federal permit reporting under the Clean Water Act, and state permit reporting for the Comprehensive Everglades Restoration Plan Regulation Act, Everglades Forever Act, Northern Everglades and Estuaries Protection Program, Environmental Resource Permitting projects, and Emergency Orders in place during the reporting period. Further details about the permit reports are available on the District's website at www.sfwmd.gov/sfer.

Glossary

Acre-feet (ac-ft): The volume required to cover 1 acre to a depth of 1 foot, commonly used to express large amounts of water (1 acre-foot = 325,900 gallons).

Ad valorem tax: A tax imposed on the value of real and personal property, as certified by the property appraiser in each county.

Alternative Water Supply (AWS): A supply of water that has been reclaimed after municipal, commercial, or agricultural uses; or a supply of storm water, or brackish or salt water, that has been treated in accordance with applicable rules and standards sufficient to supply an intended use.

Best Management Practices (BMPs): Land, agricultural, industrial, and waste management techniques that reduce pollutant export from a specified area.

Compliance monitoring: In a water quality management program, compliance is associated with meeting permit conditions as well as ambient standards. Periodic monitoring provides water quality data that are used to assess compliance.

Comprehensive Everglades Restoration Plan (CERP): The framework and guide for the restoration, protection, and preservation of the South Florida ecosystem. CERP also provides for water-related needs of the region, such as water supply and flood protection.

Discharge (or Flow): The rate of water movement past a reference point, measured as volume per unit time (usually expressed as cubic feet or cubic meters per second).

Drought: An extended period of low rainfall, below-normal streamflow, and depleted surface and subsurface storage.

Estuary: The part of the wide lower course of a river where its current is met by ocean tides or an arm of the sea at the lower end of a river where fresh and salt water meet.

Everglades Agricultural Area (EAA): An area extending south from Lake Okeechobee to the northern levee of Water Conservation Area 3A, from its eastern boundary at the L-8 canal to the western boundary along the L-1, L-2, and L-3 levees. The EAA incorporates almost 3,000 square kilometers (1,158 square miles) of highly productive agricultural land.

Everglades Construction Project (ECP): The foundation of a large ecosystem restoration program, composed of various interrelated construction projects between Lake Okeechobee and the Everglades. This includes the Everglades Stormwater Treatment Areas, which have a total area with infrastructure components of approximately 68,000 acres, with roughly 57,000 acres of effective treatment area currently operational.

Everglades Forever Act (EFA): A 1994 Florida law (Section 373.4592, Florida Statutes), amended in 2003, to promote Everglades restoration and protection. This will be achieved through comprehensive and innovative solutions to issues of water quality, water quantity, hydroperiod, and invasion of nonindigenous species to the Everglades ecosystem.

Everglades Protection Area (EPA): As defined in the Everglades Forever Act, the EPA comprises Water Conservation Areas 1, 2A, 2B, 3A, and 3B, the Arthur R. Marshall Loxahatchee National Wildlife Refuge, and Everglades National Park.



Expenditure: The disbursement of appropriated funds to purchase goods or services.

Fiscal Year (FY): The 12-month period for which the annual budget is developed and implemented. The fiscal year for the District begins on October 1 and ends on September 30.

Florida Forever Act: A 1999 Florida law (Section 259.105, Florida Statutes) authorizing the issuance of bonds to fund land acquisition, water resource development, stormwater management projects, water body restoration activities, recreational facilities, public access improvements, and invasive plant removal.

Florida Statutes (F.S.): A permanent collection of state laws organized by subject area into a code made up of titles, chapters, parts, and sections. The Florida Statutes are updated annually by laws that create, amend, or repeal statutory material.

Flow-weighted mean concentration: The average concentration of a substance in water, corrected for the volume of water flow at the time of sampling. Samples taken when flow is high are given greater weight in the average.

Geometric mean: A statistical average of a set of transformed numbers, often used to represent a central tendency in highly variable data, such as water quality. It is calculated from data transformed using powers or logarithms and then transformed back to original scale after averaging.

Loading (or mass loading): The amount of material carried by water into a specified area, expressed as mass per unit of time. One example is phosphorus loading into WCA-2A, measured in metric tons per year. Note that 1 metric ton (mt) is equivalent to 1,000 kilograms, or 2,205 pounds.

Minimum Flows and Levels (MFLs): Florida law (Chapter 373, Florida Statutes) requires the state's water management districts to set water levels for each major body of water "...at which further withdrawals would be significantly harmful to the water resources or ecology of the area."

Northern Everglades and Estuaries Protection Program (NEEPP): As defined by Florida law (Section 373.4595, Florida Statutes), an initiative to holistically restore the Everglades through increased focus and integration of regional projects in the Northern Everglades, including the Lake Okeechobee watershed, and the Caloosahatchee and St. Lucie River watersheds and estuaries.

Parts per billion (ppb): A unit of measure, equivalent to micrograms per liter (1 ppb = 1 µg/L).

Revenue: Monies received from all sources, with the exception of fund balances, that will be used to fund expenditures in a fiscal year.

Stage: The height of a water surface above an established reference point. This vertical control measurement is usually expressed as feet National Geodetic Vertical Datum of 1929 or feet North American Vertical Datum of 1988.

Stormwater Treatment Area (STA): A large, constructed wetland designed to remove pollutants, particularly nutrients, from stormwater runoff using natural processes.

Submerged aquatic vegetation (SAV): Wetland plants that exist completely below the water surface.

Total Maximum Daily Load (TMDL): The maximum allowed level of pollutant loading for a water body, while still protecting its uses and maintaining compliance with water quality standards, as defined in the Clean Water Act.

Total phosphorus (TP): An estimate of the concentration of phosphorus in both organic and inorganic forms in a water sample. In freshwater environments, increased levels of this nutrient can promote the growth of algae and other plants.

Water Conservation Areas (WCAs): Diked areas of the remnant Everglades that are hydrologically controlled for flood control and water supply purposes. These are the primary targets of Everglades restoration and major components of the Everglades Protection Area.

Water quality: The physical, chemical, and biological condition of water as applied to a specific use, typically propagation of fish and wildlife, public water supply, industry, or recreation.

Water quality criteria: Constituent concentrations based on scientific data and judgments on the relationship between pollutant concentrations and environmental and human health effects.

Water Reservations: As defined by Florida law (Subsection 373.223(4), Florida Statutes), water set aside or designated for use, in a certain location, time, or quantity, as may be required for protecting fish and wildlife or public health and safety.

Water Year (WY): The period from May 1 through April 30, during which water quality and other data are collected and reported in the South Florida Environmental Report.



Acknowledgments

The South Florida Water Management District gratefully acknowledges the many professionals who have contributed to the *2013 South Florida Environmental Report*. Along with this Executive Summary, the three-volume main report was developed collaboratively by more than 200 authors and contributors from the District, the Florida Department of Environmental Protection, and other supporting agencies and organizations with expertise in the various reporting topics. A detailed list of contributors is presented on the acknowledgments page of the main report www.sfwmd.gov/sfer.

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ON THE COVER

Fakahatchee Strand

Southwest Florida, Collier County

The Fakahatchee Strand—known as the “Amazon of North America”—is the major drainage slough of southwestern Big Cypress Swamp in Collier County. Notably, the natural values of the Fakahatchee Strand may be greater than those of any area of comparable size in the state of Florida. It hosts a wide array of habitats and forest types from the wetter swamps and prairies (front) to the drier islands of tropical hardwood hammocks and pine rock lands.

The strand, although impacted by former logging and altered drainage, is one of the biggest wilderness areas in the region and has protected wildlife such as the Florida black bear, Florida panther, and Everglades mink, as well as the most diverse and abundant assemblage of rare and unusual bromeliads and orchids in North America. With the largest stand of native royal palms, the Fakahatchee Strand ecosystem is the only place in the world where bald cypress trees and royal palms share the same forest canopy.

The Fakahatchee Strand and its contributing drainage system, the Ocaloacoochee Slough, extend south more than 30 miles to the Gulf of Mexico, where its fresh waters enter the estuaries of the 10,000 Islands near the extreme western part of the Everglades National Park—creating one of the most productive estuaries in the world. This rich area serves as a haven for many native fish and wildlife species, such as the mangrove tree crab, *Aratus pisoni* (back), as well as thriving bird rookeries.

For more information on the Fakahatchee Strand, visit www.sfwmd.gov/land



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